SEQUENCE LISTING

<110> Zon, Leonard I.
       Donovan, Adriana

<120> FERROPORTIN1 NUCLEIC ACIDS AND PROTEINS

<130> 1242.1035-002

<150> US 60/133,382
<151> 1999-05-10

<150> US 09/567,672
<151> 2000-05-09

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<170> FastSEQ for Windows Version 4.0

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aagggagata ttcgtgattt gcgcaggaat atatttgcag cgaggattta ctttgcccga 180
gccttacaaa ggagttcaaa tcccggcgag aaaaaaacaa tcgataaaaa acgcaca atg 240
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                                                                    1

gac agc cct gca tca aag aaa cct cgc tgt gag agg ttc cgc gaa ttc   288
Asp Ser Pro Ala Ser Lys Lys Pro Arg Cys Glu Arg Phe Arg Glu Phe
            5   10   15

ttc aag tct gca aaa ttc ctc att tac gtc gga cat gcc ctc tcg aca   336
Phe Lys Ser Ala Lys Phe Leu Ile Tyr Val Gly His Ala Leu Ser Thr
        20   25   30

tgg ggg gat cgg atg tgg aat ttt gct gtg gct gtg ttt ctg gtg gag   384
Trp Gly Asp Arg Met Trp Asn Phe Ala Val Ala Val Phe Leu Val Glu
    35   40   45

ctg tat ggc aat agt tta ctc ctg aca gcc gtg tat gga ctg gtg gtc   432
Leu Tyr Gly Asn Ser Leu Leu Leu Thr Ala Val Tyr Gly Leu Val Val
 50   55   60   65

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gcg ggc tcc gtg ctc tta ctg ggc gct att att ggt gac tgg gtt gac   480
Ala Gly Ser Val Leu Leu Leu Gly Ala Ile Ile Gly Asp Trp Val Asp
                70            75                    80

aaa aac ccc aga ttg aaa gtg gca cag acg tct ttg gtt gtc cag aac   528
Lys Asn Pro Arg Leu Lys Val Ala Gln Thr Ser Leu Val Val Gln Asn
                85                90                    95

agt gct gtc att ctc tgt ggt gcc ctt ttg atg gct gtt ttc cag ttc   576
Ser Ala Val Ile Leu Cys Gly Ala Leu Leu Met Ala Val Phe Gln Phe
            100               105               110

aaa caa cag ctt tct agc atg tat gat gga tgg ttg ctg aca aca tgc   624
Lys Gln Gln Leu Ser Ser Met Tyr Asp Gly Trp Leu Leu Thr Thr Cys
        115               120               125

tac ata atg gtc atc tcc att gct aat atc gct aac ctg gcc agc aca   672
Tyr Ile Met Val Ile Ser Ile Ala Asn Ile Ala Asn Leu Ala Ser Thr
130               135               140               145

gct atg tcc atc acc atc caa aga gac tgg gtt gtg gtt gtg gct gga   720
Ala Met Ser Ile Thr Ile Gln Arg Asp Trp Val Val Val Val Ala Gly
            150               155               160

gat gat cgg agc aaa ttg gca gat atg aat gca act gtc aga ata att   768
Asp Asp Arg Ser Lys Leu Ala Asp Met Asn Ala Thr Val Arg Ile Ile
        165               170               175

gac cag ttg acc aac att ctg gca ccg atg ctt gtg ggc cag atc atg   816
Asp Gln Leu Thr Asn Ile Leu Ala Pro Met Leu Val Gly Gln Ile Met
        180               185               190

gca ttt ggc tca cac ttc att ggc tgt ggt ttt atc tcg ggc tgg aac   864
Ala Phe Gly Ser His Phe Ile Gly Cys Gly Phe Ile Ser Gly Trp Asn
    195               200               205

ttg ttc tcc atg tgc ctg gag tat ttc ctg ctt tgg aaa gtt tat cag   912
Leu Phe Ser Met Cys Leu Glu Tyr Phe Leu Leu Trp Lys Val Tyr Gln
210               215               220               225

aaa act cca gcg ctt gcc ttt aag gca gga cag aag gat agc gat gac   960
Lys Thr Pro Ala Leu Ala Phe Lys Ala Gly Gln Lys Asp Ser Asp Asp
            230               235               240

caa gag ctg aaa cac ctc aac ata caa aaa gaa att gga aac act gaa  1008
Gln Glu Leu Lys His Leu Asn Ile Gln Lys Glu Ile Gly Asn Thr Glu
            245               250               255

agc ccg gtc gaa gcc tcc caa ctg atg act gaa agc tcc gag ccc aag  1056
Ser Pro Val Glu Ala Ser Gln Leu Met Thr Glu Ser Ser Glu Pro Lys
            260               265               270

aag gac acc ggc tgc tgc tac caa atg gca gag ccc atc cgt acc ttt  1104
Lys Asp Thr Gly Cys Cys Tyr Gln Met Ala Glu Pro Ile Arg Thr Phe
    275               280               285
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aaa gat ggc tgg gta gcc tac tac aat caa tcc atc ttc ttc gcc ggc    1152
Lys Asp Gly Trp Val Ala Tyr Tyr Asn Gln Ser Ile Phe Phe Ala Gly
290             295             300             305

atg tct ctg gct ttc cta tac atg acc gtt ttg ggc ttc gac tgc atc    1200
Met Ser Leu Ala Phe Leu Tyr Met Thr Val Leu Gly Phe Asp Cys Ile
            310             315             320

acc aca ggc tat gca tac act cag ggc ctg aat ggc tct gtg ctc agt    1248
Thr Thr Gly Tyr Ala Tyr Thr Gln Gly Leu Asn Gly Ser Val Leu Ser
            325             330             335

ctc ctc atg gga gcc tca gct gta tct ggg atc tgt ggg aca gtg gcc    1296
Leu Leu Met Gly Ala Ser Ala Val Ser Gly Ile Cys Gly Thr Val Ala
            340             345             350

ttc acc tgg atc cga aag aag tgc ggc ctc atc agg acg ggc ttc att    1344
Phe Thr Trp Ile Arg Lys Lys Cys Gly Leu Ile Arg Thr Gly Phe Ile
            355             360             365

gct gga gtc acc cag ctg tcc tgc ctc acg ctg tgt gta gca tct gtc    1392
Ala Gly Val Thr Gln Leu Ser Cys Leu Thr Leu Cys Val Ala Ser Val
370             375             380             385

ttc gcc cct ggt agc cct ttc gat ctc agc gtc tcg ccc ttc aaa gag    1440
Phe Ala Pro Gly Ser Pro Phe Asp Leu Ser Val Ser Pro Phe Lys Glu
            390             395             400

gtc tta aga cat ctg ttt gga gac agc ggc tcg ctg cgt gag agt cct    1488
Val Leu Arg His Leu Phe Gly Asp Ser Gly Ser Leu Arg Glu Ser Pro
            405             410             415

aca ttc att cct aca act gaa ccc ccg att cag gcc aac gtc acc gtt    1536
Thr Phe Ile Pro Thr Thr Glu Pro Pro Ile Gln Ala Asn Val Thr Val
            420             425             430

ttt gag gaa gcc ccc cca gta gag tcc tac atg tct gtt ggg ctt ctc    1584
Phe Glu Glu Ala Pro Pro Val Glu Ser Tyr Met Ser Val Gly Leu Leu
            435             440             445

ttt gcc ggt gtt att gct gct aga gtt ggt ctt tgg tcc ttc gac ttg    1632
Phe Ala Gly Val Ile Ala Ala Arg Val Gly Leu Trp Ser Phe Asp Leu
450             455             460             465

acc gtg acc caa ctg atc caa gag aat gtg att gag tcc gag aga gga    1680
Thr Val Thr Gln Leu Ile Gln Glu Asn Val Ile Glu Ser Glu Arg Gly
            470             475             480

gtc atc aat ggc gtc cag aac tcc atg aat tat ctt ctc gat ctc ctg    1728
Val Ile Asn Gly Val Gln Asn Ser Met Asn Tyr Leu Leu Asp Leu Leu
            485             490             495
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cac ttc atc atg gtc atc ctt gca cca aat cct gaa gcc ttt ggt ctt    1776
His Phe Ile Met Val Ile Leu Ala Pro Asn Pro Glu Ala Phe Gly Leu
        500             505             510

ctt gta atc atc tcc gtt tcc ttc gtg gct atg gga cat atg atg tat    1824
Leu Val Ile Ile Ser Val Ser Phe Val Ala Met Gly His Met Met Tyr
        515             520             525

ttc agg ttt gct tat aaa agc ctt gga agc cga ctc ttc ctg ttc tgt    1872
Phe Arg Phe Ala Tyr Lys Ser Leu Gly Ser Arg Leu Phe Leu Phe Cys
530             535             540             545

tca ccc gag cag aag cca gat ccc aac att ccc tca ctt cca aac tct    1920
Ser Pro Glu Gln Lys Pro Asp Pro Asn Ile Pro Ser Leu Pro Asn Ser
                550             555             560

gta tag cttttaaag agaccgtagg ccattctac aagagcgtgg cttgctgtgt      1976
Val  *
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catccttta aaaccacagc tggctcgaca tagatatata gatatatata tatgaggtgt  3176
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cctagattat tctttatata agcatattga ttctgttcat gtttggtggc atatttgcaa 3656
taattgtggt tcacactcca tcgcagtggg aggattatag aactttagtc ttgtattgta 3716
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<400> 2

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			20					25					30		
Thr	Trp	Gly	Asp	Arg	Met	Trp	Asn	Phe	Ala	Val	Ala	Val	Phe	Leu	Val
			35					40					45		
Glu	Leu	Tyr	Gly	Asn	Ser	Leu	Leu	Leu	Thr	Ala	Val	Tyr	Gly	Leu	Val
		50					55					60			
Val	Ala	Gly	Ser	Val	Leu	Leu	Leu	Gly	Ala	Ile	Ile	Gly	Asp	Trp	Val
65					70					75					80
Asp	Lys	Asn	Pro	Arg	Leu	Lys	Val	Ala	Gln	Thr	Ser	Leu	Val	Val	Gln
			85					90					95		
Asn	Ser	Ala	Val	Ile	Leu	Cys	Gly	Ala	Leu	Leu	Met	Ala	Val	Phe	Gln
			100					105					110		
Phe	Lys	Gln	Gln	Leu	Ser	Ser	Met	Tyr	Asp	Gly	Trp	Leu	Leu	Thr	Thr
		115					120					125			
Cys	Tyr	Ile	Met	Val	Ile	Ser	Ile	Ala	Asn	Ile	Ala	Asn	Leu	Ala	Ser
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Thr	Ala	Met	Ser	Ile	Thr	Ile	Gln	Arg	Asp	Trp	Val	Val	Val	Val	Ala
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Gly	Asp	Asp	Arg	Ser	Lys	Leu	Ala	Asp	Met	Asn	Ala	Thr	Val	Arg	Ile
			165					170					175		
Ile	Asp	Gln	Leu	Thr	Asn	Ile	Leu	Ala	Pro	Met	Leu	Val	Gly	Gln	Ile
			180					185					190		
Met	Ala	Phe	Gly	Ser	His	Phe	Ile	Gly	Cys	Gly	Phe	Ile	Ser	Gly	Trp
		195					200					205			
Asn	Leu	Phe	Ser	Met	Cys	Leu	Glu	Tyr	Phe	Leu	Leu	Trp	Lys	Val	Tyr
		210					215					220			
Gln	Lys	Thr	Pro	Ala	Leu	Ala	Phe	Lys	Ala	Gly	Gln	Lys	Asp	Ser	Asp
225					230					235					240
Asp	Gln	Glu	Leu	Lys	His	Leu	Asn	Ile	Gln	Lys	Glu	Ile	Gly	Asn	Thr
			245					250					255		
Glu	Ser	Pro	Val	Glu	Ala	Ser	Gln	Leu	Met	Thr	Glu	Ser	Ser	Glu	Pro
			260					265					270		
Lys	Lys	Asp	Thr	Gly	Cys	Cys	Tyr	Gln	Met	Ala	Glu	Pro	Ile	Arg	Thr
		275					280					285			
Phe	Lys	Asp	Gly	Trp	Val	Ala	Tyr	Tyr	Asn	Gln	Ser	Ile	Phe	Phe	Ala
		290					295					300			
Gly	Met	Ser	Leu	Ala	Phe	Leu	Tyr	Met	Thr	Val	Leu	Gly	Phe	Asp	Cys
305					310					315					320
Ile	Thr	Thr	Gly	Tyr	Ala	Tyr	Thr	Gln	Gly	Leu	Asn	Gly	Ser	Val	Leu
			325					330					335		
Ser	Leu	Leu	Met	Gly	Ala	Ser	Ala	Val	Ser	Gly	Ile	Cys	Gly	Thr	Val
			340					345					350		
Ala	Phe	Thr	Trp	Ile	Arg	Lys	Lys	Cys	Gly	Leu	Ile	Arg	Thr	Gly	Phe
		355					360					365			
Ile	Ala	Gly	Val	Thr	Gln	Leu	Ser	Cys	Leu	Thr	Leu	Cys	Val	Ala	Ser
	370					375					380				

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Val Phe Ala Pro Gly Ser Pro Phe Asp Leu Ser Val Ser Pro Phe Lys
385                 390             395                 400
Glu Val Leu Arg His Leu Phe Gly Asp Ser Gly Ser Leu Arg Glu Ser
                405             410                 415
Pro Thr Phe Ile Pro Thr Thr Glu Pro Pro Ile Gln Ala Asn Val Thr
            420             425                 430
Val Phe Glu Glu Ala Pro Pro Val Glu Ser Tyr Met Ser Val Gly Leu
        435             440                 445
Leu Phe Ala Gly Val Ile Ala Ala Arg Val Gly Leu Trp Ser Phe Asp
        450             455                 460
Leu Thr Val Thr Gln Leu Ile Gln Glu Asn Val Ile Glu Ser Glu Arg
465                 470                 475                 480
Gly Val Ile Asn Gly Val Gln Asn Ser Met Asn Tyr Leu Leu Asp Leu
                485             490                 495
Leu His Phe Ile Met Val Ile Leu Ala Pro Asn Pro Glu Ala Phe Gly
            500             505                 510
Leu Leu Val Ile Ile Ser Val Ser Phe Val Ala Met Gly His Met Met
            515             520                 525
Tyr Phe Arg Phe Ala Tyr Lys Ser Leu Gly Ser Arg Leu Phe Leu Phe
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Cys Ser Pro Glu Gln Lys Pro Asp Pro Asn Ile Pro Ser Leu Pro Asn
545                 550                 555                 560
Ser Val
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<222> (298)...(2010)

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cgtgacagct ttgctgttgt tgtttgcctt agttgtcctt tggggtcttt cggcataagg 180
ctgttgtgct tatactggtg ctatcttcgg ttcctctcac tcctgtgaac aagctcccgg 240
gcaagagcag ctaaagctac cagcatcaga caaacaagg ggagaacgcc tggtgtc atg 300
                                                               Met
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acc aag gca aga gat caa acc cat cag gaa gga tgc tgt gga tcc tta    348
Thr Lys Ala Arg Asp Gln Thr His Gln Glu Gly Cys Cys Gly Ser Leu
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gca aac tac ctg acc tca gca aaa ttc ctc ctc tac ctt ggc cac tct    396
Ala Asn Tyr Leu Thr Ser Ala Lys Phe Leu Leu Tyr Leu Gly His Ser
            20                  25                  30

ctc tcc act tgg ggg gat cgg atg tgg cac ttt gca gtg tct gtg ttt    444
Leu Ser Thr Trp Gly Asp Arg Met Trp His Phe Ala Val Ser Val Phe
        35                  40                  45
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ctg gtg gaa ctc tat gga aac agc ctt ctc ttg aca gct gtc tat gga    492
Leu Val Glu Leu Tyr Gly Asn Ser Leu Leu Leu Thr Ala Val Tyr Gly
 50                  55                  60                  65

ctg gtg gtg gca ggc tct gtt ctg gtc ctg gga gcc atc att ggt gac    540
Leu Val Val Ala Gly Ser Val Leu Val Leu Gly Ala Ile Ile Gly Asp
                    70                  75                  80

tgg gtg gat aag aat gcc aga ctt aaa gtg gcc cag acg tca ctg gtg    588
Trp Val Asp Lys Asn Ala Arg Leu Lys Val Ala Gln Thr Ser Leu Val
                85                  90                  95

gtt cag aat gtg tcc gtc atc ctc tgc gga atc atc ctg atg atg gtt    636
Val Gln Asn Val Ser Val Ile Leu Cys Gly Ile Ile Leu Met Met Val
                100                 105                 110

ttc cta cac aag aat gag ctc ctg acc atg tac cat gga tgg gtc ctt    684
Phe Leu His Lys Asn Glu Leu Leu Thr Met Tyr His Gly Trp Val Leu
        115                 120                 125

act gtc tgc tac atc ctg atc atc act att gca aac att gca aat ttg    732
Thr Val Cys Tyr Ile Leu Ile Ile Thr Ile Ala Asn Ile Ala Asn Leu
130                 135                 140                 145

gcc agt act gcc act gcg atc aca atc caa agg gac tgg att gtt gtt    780
Ala Ser Thr Ala Thr Ala Ile Thr Ile Gln Arg Asp Trp Ile Val Val
                150                 155                 160

gtg gca gga gaa aac agg agc aga tta gca gac atg aat gct acc att    828
Val Ala Gly Glu Asn Arg Ser Arg Leu Ala Asp Met Asn Ala Thr Ile
                165                 170                 175

aga agg att gac cag cta acc aac atc ctg gcc ccc atg gct gtc ggc    876
Arg Arg Ile Asp Gln Leu Thr Asn Ile Leu Ala Pro Met Ala Val Gly
        180                 185                 190

cag att atg aca ttt ggt tct cca gtc att ggc tgt ggt ttt att tcc    924
Gln Ile Met Thr Phe Gly Ser Pro Val Ile Gly Cys Gly Phe Ile Ser
        195                 200                 205

ggt tgg aat ttg gtg tcc atg tgt gtg gag tac ttc ttg ctc tgg aag    972
Gly Trp Asn Leu Val Ser Met Cys Val Glu Tyr Phe Leu Leu Trp Lys
210                 215                 220                 225

gtt tac cag aag acc cct gct ctg gct gta aaa gct gct ctc aag gta   1020
Val Tyr Gln Lys Thr Pro Ala Leu Ala Val Lys Ala Ala Leu Lys Val
                230                 235                 240

gag gag tca gaa ctg aag cag ctg acc tca cct aaa gat act gag cca   1068
Glu Glu Ser Glu Leu Lys Gln Leu Thr Ser Pro Lys Asp Thr Glu Pro
                245                 250                 255
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aaa cct ttg gag gga act cat cta atg ggt gag aaa gac tcc aac atc    1116
Lys Pro Leu Glu Gly Thr His Leu Met Gly Glu Lys Asp Ser Asn Ile
        260             265             270

cgt gaa ctt gaa tgt gaa caa gag ccc acc tgt gcc tcc cag atg gca    1164
Arg Glu Leu Glu Cys Glu Gln Glu Pro Thr Cys Ala Ser Gln Met Ala
        275             280             285

gag ccc ttc cgc act ttc cga gat gga tgg gtc tcc tac tat aac cag    1212
Glu Pro Phe Arg Thr Phe Arg Asp Gly Trp Val Ser Tyr Tyr Asn Gln
290             295             300             305

cca gtg ttt ctg gct ggc atg ggc ctg gct ttc ctc tat atg aca gtc    1260
Pro Val Phe Leu Ala Gly Met Gly Leu Ala Phe Leu Tyr Met Thr Val
            310             315             320

ctg ggc ttt gac tgt atc act aca ggg tac gcc tac act cag ggg ctg    1308
Leu Gly Phe Asp Cys Ile Thr Thr Gly Tyr Ala Tyr Thr Gln Gly Leu
            325             330             335

agt gga tcc atc ctt agt att ttg atg gga gca tca gca ata act gga    1356
Ser Gly Ser Ile Leu Ser Ile Leu Met Gly Ala Ser Ala Ile Thr Gly
        340             345             350

ata atg gga act gtg gcc ttc acc tgg cta cgt cga aaa tgt ggc ctt    1404
Ile Met Gly Thr Val Ala Phe Thr Trp Leu Arg Arg Lys Cys Gly Leu
        355             360             365

gtt cgg act ggt cta ttc tca gga cta gcc cag ctt tcc tgt tta atc    1452
Val Arg Thr Gly Leu Phe Ser Gly Leu Ala Gln Leu Ser Cys Leu Ile
370             375             380             385

ttg tgt gtg atc tcc gta ttc atg cct gga agc ccc ttg gac ctg tct    1500
Leu Cys Val Ile Ser Val Phe Met Pro Gly Ser Pro Leu Asp Leu Ser
            390             395             400

gtt tct cca ttt gaa gat atc cgt tct agg ttt gtg aat gtg gag cca    1548
Val Ser Pro Phe Glu Asp Ile Arg Ser Arg Phe Val Asn Val Glu Pro
        405             410             415

gtg tcc cca act acc aaa ata cct gag acc gtc ttt aca aca gaa atg    1596
Val Ser Pro Thr Thr Lys Ile Pro Glu Thr Val Phe Thr Thr Glu Met
        420             425             430

cat atg tcc aac atg tct aat gtc cat gag atg agt act aaa ccc atc    1644
His Met Ser Asn Met Ser Asn Val His Glu Met Ser Thr Lys Pro Ile
        435             440             445

ccc ata gtc tct gtc agc ctg ctg ttt gca gga gtc att gct gct aga    1692
Pro Ile Val Ser Val Ser Leu Leu Phe Ala Gly Val Ile Ala Ala Arg
450             455             460             465

atc ggt ctt tgg tcc ttt gat ttg acg gtg aca cag ttg ctg caa gaa    1740
Ile Gly Leu Trp Ser Phe Asp Leu Thr Val Thr Gln Leu Leu Gln Glu
            470             475             480
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aat gta att gaa tct gaa aga ggc att atc aat ggt gtg cag aac tcc   1788
Asn Val Ile Glu Ser Glu Arg Gly Ile Ile Asn Gly Val Gln Asn Ser
            485                 490                 495

atg aac tac ctt ctt gac ctt ctg cat ttc atc atg gtc atc ttg gcc   1836
Met Asn Tyr Leu Leu Asp Leu Leu His Phe Ile Met Val Ile Leu Ala
            500                 505                 510

cca aat cct gaa gct ttt ggc ttg ctg gta ttg att tca gtc tcc ttt   1884
Pro Asn Pro Glu Ala Phe Gly Leu Leu Val Leu Ile Ser Val Ser Phe
            515                 520                 525

gtg gca atg gga cat ctt atg tat ttc cga ttt gcc cag aag act ctg   1932
Val Ala Met Gly His Leu Met Tyr Phe Arg Phe Ala Gln Lys Thr Leu
530                 535                 540                 545

ggc aac cag att ttt gtt tgt ggt cct gat gaa aaa gaa gtt aca gat   1980
Gly Asn Gln Ile Phe Val Cys Gly Pro Asp Glu Lys Glu Val Thr Asp
                550                 555                 560

gaa aat caa ccg aat aca tct gtt gta taa aaatagttta gctgtggccc   2030
Glu Asn Gln Pro Asn Thr Ser Val Val  *
                565                 570

ctgttactag attgtggaga gcatgtgtgc ttattttgta ctgcagaatc ccaataaatg 2090
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Leu Ala Asn Tyr Leu Thr Ser Ala Lys Phe Leu Leu Tyr Leu Gly His
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Ser Leu Ser Thr Trp Gly Asp Arg Met Trp His Phe Ala Val Ser Val
            35                  40                  45
Phe Leu Val Glu Leu Tyr Gly Asn Ser Leu Leu Leu Thr Ala Val Tyr
            50                  55                  60
Gly Leu Val Val Ala Gly Ser Val Leu Val Leu Gly Ala Ile Ile Gly
65                  70                  75                  80
Asp Trp Val Asp Lys Asn Ala Arg Leu Lys Val Ala Gln Thr Ser Leu
            85                  90                  95
Val Val Gln Asn Val Ser Val Ile Leu Cys Gly Ile Ile Leu Met Met
            100                 105                 110
Val Phe Leu His Lys Asn Glu Leu Leu Thr Met Tyr His Gly Trp Val
            115                 120                 125
Leu Thr Val Cys Tyr Ile Leu Ile Ile Thr Ile Ala Asn Ile Ala Asn
            130                 135                 140
Leu Ala Ser Thr Ala Thr Ala Ile Thr Ile Gln Arg Asp Trp Ile Val
145                 150                 155                 160
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Val Val Ala Gly Glu Asn Arg Ser Arg Leu Ala Asp Met Asn Ala Thr
                165   170   175
Ile Arg Arg Ile Asp Gln Leu Thr Asn Ile Leu Ala Pro Met Ala Val
                180   185   190
Gly Gln Ile Met Thr Phe Gly Ser Pro Val Ile Gly Cys Gly Phe Ile
                195   200   205
Ser Gly Trp Asn Leu Val Ser Met Cys Val Glu Tyr Phe Leu Leu Trp
            210   215   220
Lys Val Tyr Gln Lys Thr Pro Ala Leu Ala Val Lys Ala Ala Leu Lys
225   230   235   240
Val Glu Glu Ser Glu Leu Lys Gln Leu Thr Ser Pro Lys Asp Thr Glu
                245   250   255
Pro Lys Pro Leu Glu Gly Thr His Leu Met Gly Glu Lys Asp Ser Asn
                260   265   270
Ile Arg Glu Leu Glu Cys Glu Gln Glu Pro Thr Cys Ala Ser Gln Met
            275   280   285
Ala Glu Pro Phe Arg Thr Phe Arg Asp Gly Trp Val Ser Tyr Tyr Asn
            290   295   300
Gln Pro Val Phe Leu Ala Gly Met Gly Leu Ala Phe Leu Tyr Met Thr
305   310   315   320
Val Leu Gly Phe Asp Cys Ile Thr Thr Gly Tyr Ala Tyr Thr Gln Gly
                325   330   335
Leu Ser Gly Ser Ile Leu Ser Ile Leu Met Gly Ala Ser Ala Ile Thr
                340   345   350
Gly Ile Met Gly Thr Val Ala Phe Thr Trp Leu Arg Arg Lys Cys Gly
            355   360   365
Leu Val Arg Thr Gly Leu Phe Ser Gly Leu Ala Gln Leu Ser Cys Leu
            370   375   380
Ile Leu Cys Val Ile Ser Val Phe Met Pro Gly Ser Pro Leu Asp Leu
385   390   395   400
Ser Val Ser Pro Phe Glu Asp Ile Arg Ser Arg Phe Val Asn Val Glu
                405   410   415
Pro Val Ser Pro Thr Thr Lys Ile Pro Glu Thr Val Phe Thr Thr Glu
                420   425   430
Met His Met Ser Asn Met Ser Asn Val His Glu Met Ser Thr Lys Pro
            435   440   445
Ile Pro Ile Val Ser Val Ser Leu Leu Phe Ala Gly Val Ile Ala Ala
            450   455   460
Arg Ile Gly Leu Trp Ser Phe Asp Leu Thr Val Thr Gln Leu Leu Gln
465   470   475   480
Glu Asn Val Ile Glu Ser Glu Arg Gly Ile Ile Asn Gly Val Gln Asn
                485   490   495
Ser Met Asn Tyr Leu Leu Asp Leu Leu His Phe Ile Met Val Ile Leu
            500   505   510
Ala Pro Asn Pro Glu Ala Phe Gly Leu Leu Val Leu Ile Ser Val Ser
            515   520   525
Phe Val Ala Met Gly His Leu Met Tyr Phe Arg Phe Ala Gln Lys Thr
            530   535   540
Leu Gly Asn Gln Ile Phe Val Cys Gly Pro Asp Glu Lys Glu Val Thr
545   550   555   560
Asp Glu Asn Gln Pro Asn Thr Ser Val Val
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gaaaatccct gggccccttt tcttttgttc tttgccaaag tcgtcgttgt agtctttttg 180
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cacctcagcg agagcagcag cagcgatagc agccgcagaa gagccagcgg ggtcgcctag 300
tgtc atg acc agg gcg gga gat cac aac cgc cag aga gga tgc tgt gga 349
     Met Thr Arg Ala Gly Asp His Asn Arg Gln Arg Gly Cys Cys Gly
     1               5                   10                  15
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tcc ttg gcc gac tac ctg acc tct gca aaa ttc ctt ctc tac ctt ggt   397
Ser Leu Ala Asp Tyr Leu Thr Ser Ala Lys Phe Leu Leu Tyr Leu Gly
                20                  25                  30
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```
cat tct ctc tct act tgg gga gat cgg atg tgg cac ttt gcg gtg tct   445
His Ser Leu Ser Thr Trp Gly Asp Arg Met Trp His Phe Ala Val Ser
            35                  40                  45
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```
gtg ttt ctg gta gag ctc tat gga aac agc ctc ctt ttg aca gca gtc   493
Val Phe Leu Val Glu Leu Tyr Gly Asn Ser Leu Leu Leu Thr Ala Val
        50                  55                  60
```

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tac ggg ctg gtg gtg gca ggg tct gtt ctg gtc ctg gga gcc atc atc   541
Tyr Gly Leu Val Val Ala Gly Ser Val Leu Val Leu Gly Ala Ile Ile
    65                  70                  75
```

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ggt gac tgg gtg gac aag aat gct aga ctt aaa gtg gcc cag acc tcg   589
Gly Asp Trp Val Asp Lys Asn Ala Arg Leu Lys Val Ala Gln Thr Ser
80          85                  90                  95
```

```
ctg gtg gta cag aat gtt tca gtc atc ctg tgt gga atc atc ctg atg   637
Leu Val Val Gln Asn Val Ser Val Ile Leu Cys Gly Ile Ile Leu Met
                100                 105                 110
```

```
atg gtt ttc tta cat aaa cat gag ctt ctg acc atg tac cat gga tgg   685
Met Val Phe Leu His Lys His Glu Leu Leu Thr Met Tyr His Gly Trp
            115                 120                 125
```

```
gtt ctc act tcc tgc tat atc ctg atc atc act att gca aat att gca   733
Val Leu Thr Ser Cys Tyr Ile Leu Ile Ile Thr Ile Ala Asn Ile Ala
        130                 135                 140
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aat ttg gcc agt act gct act gca atc aca atc caa agg gat tgg att   781
Asn Leu Ala Ser Thr Ala Thr Ala Ile Thr Ile Gln Arg Asp Trp Ile
    145                 150                 155
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gtt gtt gtt gca gga gaa gac aga agc aaa cta gca aat atg aat gcc   829
Val Val Val Ala Gly Glu Asp Arg Ser Lys Leu Ala Asn Met Asn Ala
160             165             170             175

aca ata cga agg att gac cag tta acc aac atc tta gcc ccc atg gct   877
Thr Ile Arg Arg Ile Asp Gln Leu Thr Asn Ile Leu Ala Pro Met Ala
            180             185             190

gtt ggc cag att atg aca ttt ggc tcc cca gtc atc ggc tgt ggc ttt   925
Val Gly Gln Ile Met Thr Phe Gly Ser Pro Val Ile Gly Cys Gly Phe
            195             200             205

att tcg gga tgg aac ttg gta tcc atg tgc gtg gag tac gtc ctg ctc   973
Ile Ser Gly Trp Asn Leu Val Ser Met Cys Val Glu Tyr Val Leu Leu
            210             215             220

tgg aag gtt tac cag aaa acc cca gct cta gct gtg aaa gct ggt ctt  1021
Trp Lys Val Tyr Gln Lys Thr Pro Ala Leu Ala Val Lys Ala Gly Leu
            225             230             235

aaa gaa gag gaa act gaa ttg aaa cag ctg aat tta cac aaa gat act  1069
Lys Glu Glu Glu Thr Glu Leu Lys Gln Leu Asn Leu His Lys Asp Thr
240             245             250             255

gag cca aaa ccc ctg gag gga act cat cta atg ggt gtg aaa gac tct  1117
Glu Pro Lys Pro Leu Glu Gly Thr His Leu Met Gly Val Lys Asp Ser
            260             265             270

aac atc cat gag ctt gaa cat gag caa gag cct act tgt gcc tcc cag  1165
Asn Ile His Glu Leu Glu His Glu Gln Glu Pro Thr Cys Ala Ser Gln
            275             280             285

atg gct gag ccc ttc cgt acc ttc cga gat gga tgg gtc tcc tac tac  1213
Met Ala Glu Pro Phe Arg Thr Phe Arg Asp Gly Trp Val Ser Tyr Tyr
            290             295             300

aac cag cct gtg ttt ctg gct ggc atg ggt ctt gct ttc ctt tat atg  1261
Asn Gln Pro Val Phe Leu Ala Gly Met Gly Leu Ala Phe Leu Tyr Met
            305             310             315

act gtc ctg ggc ttt gac tgc atc acc aca ggg tac gcc tac act cag  1309
Thr Val Leu Gly Phe Asp Cys Ile Thr Thr Gly Tyr Ala Tyr Thr Gln
320             325             330             335

gga ctg agt ggt tcc atc ctc agt att ttg atg gga gca tca gct ata  1357
Gly Leu Ser Gly Ser Ile Leu Ser Ile Leu Met Gly Ala Ser Ala Ile
            340             345             350

act gga ata atg gga act gta gct ttt act tgg cta cgt cga aaa tgt  1405
Thr Gly Ile Met Gly Thr Val Ala Phe Thr Trp Leu Arg Arg Lys Cys
            355             360             365

ggt ttg gtt cgg aca ggt ctg atc tca gga ttg gca cag ctt tcc tgt  1453
Gly Leu Val Arg Thr Gly Leu Ile Ser Gly Leu Ala Gln Leu Ser Cys
            370             375             380
```

```
ttg atc ttg tgt gtg atc tct gta ttc atg cct gga agc ccc ctg gac   1501
Leu Ile Leu Cys Val Ile Ser Val Phe Met Pro Gly Ser Pro Leu Asp
    385                 390                 395

ttg tcc gtt tct cct ttt gaa gat atc cga tca agg ttc att caa gga   1549
Leu Ser Val Ser Pro Phe Glu Asp Ile Arg Ser Arg Phe Ile Gln Gly
400                 405                 410                 415

gag tca att aca cct acc aag ata cct gaa att aca act gaa ata tac   1597
Glu Ser Ile Thr Pro Thr Lys Ile Pro Glu Ile Thr Thr Glu Ile Tyr
                420                 425                 430

atg tct aat ggg tct aat tct gct aat att gtc ccg gag aca agt cct   1645
Met Ser Asn Gly Ser Asn Ser Ala Asn Ile Val Pro Glu Thr Ser Pro
                435                 440                 445

gaa tct gtg ccc ata atc tct gtc agt ctg ctg ttt gca ggc gtc att   1693
Glu Ser Val Pro Ile Ile Ser Val Ser Leu Leu Phe Ala Gly Val Ile
            450                 455                 460

gct gct aga atc ggt ctt tgg tcc ttt gat tta act gtg aca cag ttg   1741
Ala Ala Arg Ile Gly Leu Trp Ser Phe Asp Leu Thr Val Thr Gln Leu
    465                 470                 475

ctg caa gaa aat gta att gaa tct gaa aga ggc att ata aat ggt gta   1789
Leu Gln Glu Asn Val Ile Glu Ser Glu Arg Gly Ile Ile Asn Gly Val
480                 485                 490                 495

cag aac tcc atg aac tat ctt ctt gat ctt ctg cat ttc atc atg gtc   1837
Gln Asn Ser Met Asn Tyr Leu Leu Asp Leu Leu His Phe Ile Met Val
                500                 505                 510

atc ctg gct cca aat cct gaa gct ttt ggc ttg ctc gta ttg att tca   1885
Ile Leu Ala Pro Asn Pro Glu Ala Phe Gly Leu Leu Val Leu Ile Ser
                515                 520                 525

gtc tcc ttt gtg gca atg ggc cac att atg tat ttc cga ttt gcc caa   1933
Val Ser Phe Val Ala Met Gly His Ile Met Tyr Phe Arg Phe Ala Gln
            530                 535                 540

aat act ctg gga aac aag ctc ttt gct tgc ggt cct gat gca aaa gaa   1981
Asn Thr Leu Gly Asn Lys Leu Phe Ala Cys Gly Pro Asp Ala Lys Glu
    545                 550                 555

gtt agg aag gaa aat caa gca aat aca tct gtt gtt tga gacagtttaa    2030
Val Arg Lys Glu Asn Gln Ala Asn Thr Ser Val Val  *
560                 565                 570

ctgttgctat cctgttacta gattatatag agcacatgtg cttattttgt actgcagaat 2090
tccaataaat ggctgggtgt tttgctctgt ttttaccaca gctgtgcctt gagaactaaa 2150
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Ser Leu Ser Thr Trp Gly Asp Arg Met Trp His Phe Ala Val Ser Val
            35   40   45
Phe Leu Val Glu Leu Tyr Gly Asn Ser Leu Leu Leu Thr Ala Val Tyr
        50   55   60
Gly Leu Val Val Ala Gly Ser Val Leu Val Leu Gly Ala Ile Ile Gly
65   70   75   80
Asp Trp Val Asp Lys Asn Ala Arg Leu Lys Val Ala Gln Thr Ser Leu
                85   90   95
Val Val Gln Asn Val Ser Val Ile Leu Cys Gly Ile Ile Leu Met Met
                100   105   110
Val Phe Leu His Lys His Glu Leu Leu Thr Met Tyr His Gly Trp Val
            115   120   125
Leu Thr Ser Cys Tyr Ile Leu Ile Ile Thr Ile Ala Asn Ile Ala Asn
        130   135   140
Leu Ala Ser Thr Ala Thr Ala Ile Thr Ile Gln Arg Asp Trp Ile Val
145   150   155   160
Val Val Ala Gly Glu Asp Arg Ser Lys Leu Ala Asn Met Asn Ala Thr
                165   170   175
Ile Arg Arg Ile Asp Gln Leu Thr Asn Ile Leu Ala Pro Met Ala Val
                180   185   190
Gly Gln Ile Met Thr Phe Gly Ser Pro Val Ile Gly Cys Gly Phe Ile
            195   200   205
Ser Gly Trp Asn Leu Val Ser Met Cys Val Glu Tyr Val Leu Leu Trp
        210   215   220
Lys Val Tyr Gln Lys Thr Pro Ala Leu Ala Val Lys Ala Gly Leu Lys
225   230   235   240
Glu Glu Glu Thr Glu Leu Lys Gln Leu Asn Leu His Lys Asp Thr Glu
                245   250   255
Pro Lys Pro Leu Glu Gly Thr His Leu Met Gly Val Lys Asp Ser Asn
                260   265   270
Ile His Glu Leu Glu His Glu Gln Glu Pro Thr Cys Ala Ser Gln Met
            275   280   285
Ala Glu Pro Phe Arg Thr Phe Arg Asp Gly Trp Val Ser Tyr Tyr Asn
        290   295   300
Gln Pro Val Phe Leu Ala Gly Met Gly Leu Ala Phe Leu Tyr Met Thr
305   310   315   320
Val Leu Gly Phe Asp Cys Ile Thr Thr Gly Tyr Ala Tyr Thr Gln Gly
                325   330   335
Leu Ser Gly Ser Ile Leu Ser Ile Leu Met Gly Ala Ser Ala Ile Thr
                340   345   350
Gly Ile Met Gly Thr Val Ala Phe Thr Trp Leu Arg Arg Lys Cys Gly
            355   360   365
Leu Val Arg Thr Gly Leu Ile Ser Gly Leu Ala Gln Leu Ser Cys Leu
        370   375   380

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Ile Leu Cys Val Ile Ser Val Phe Met Pro Gly Ser Pro Leu Asp Leu
385                 390             395                 400
Ser Val Ser Pro Phe Glu Asp Ile Arg Ser Arg Phe Ile Gln Gly Glu
            405             410             415
Ser Ile Thr Pro Thr Lys Ile Pro Glu Ile Thr Thr Glu Ile Tyr Met
            420             425             430
Ser Asn Gly Ser Asn Ser Ala Asn Ile Val Pro Glu Thr Ser Pro Glu
        435             440             445
Ser Val Pro Ile Ile Ser Val Ser Leu Leu Phe Ala Gly Val Ile Ala
    450             455             460
Ala Arg Ile Gly Leu Trp Ser Phe Asp Leu Thr Val Thr Gln Leu Leu
465             470             475             480
Gln Glu Asn Val Ile Glu Ser Glu Arg Gly Ile Ile Asn Gly Val Gln
            485             490             495
Asn Ser Met Asn Tyr Leu Leu Asp Leu Leu His Phe Ile Met Val Ile
            500             505             .510
Leu Ala Pro Asn Pro Glu Ala Phe Gly Leu Leu Val Leu Ile Ser Val
            515             520             525
Ser Phe Val Ala Met Gly His Ile Met Tyr Phe Arg Phe Ala Gln Asn
    530             535             540
Thr Leu Gly Asn Lys Leu Phe Ala Cys Gly Pro Asp Ala Lys Glu Val
545             550             555             560
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